

[*With Mr Lister's compliments.*]

PROFESSOR VOLKMANN

ON

ANTISEPTIC OSTEOTOMY.

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ANTISEPTIC OSTEOTOMY.

INTRODUCTORY NOTE BY MR LISTER.

THE following paper by Professor Volkmann of Halle seems to me well worthy of the notice of British surgeons, not only on account of the novelty and interest of the method of treatment which it describes, but also from the example which it presents of a surgeon, deservedly occupying a very high position in the profession in Germany, who, appreciating the paramount importance of the antiseptic principle, carries it out with an intelligent care such as can alone ensure success. The passage which I have italicized breathes the true spirit of earnest scientific surgery, and is as remarkable for the modesty as for the confidence of its tone.

Professor Volkmann's confidence, moreover, is amply sustained by his facts. The manner in which the wounds healed in the cases detailed in this paper, the blood-clot between their gaping lips becoming organized, and the epidermic pellicle forming beneath an outer layer of the coagulum, so that cicatrization took place without any suppuration, and without even the occurrence of granulation, is clear proof that he has made himself thoroughly master of the antiseptic method; and the statistical evidence which he adduces of the success of that method in his hands, including the entire banishment of pyæmia from an old and overcrowded hospital, under the most unfavourable hygienic conditions in other respects, will I trust receive the serious attention which it deserves.

The two cases here reported, in which osteotomy was performed on account of ankylosis of the knee-joint, may perhaps be considered instances of unjustifiable interference by many surgeons who are obliged to treat their patients under unfavourable hygienic conditions, and have not yet learned to appreciate the protection afforded by Lister's method of treatment.

Both patients were girls almost arrived at puberty, who had been obliged to walk with crutches for years, the knee being bent at a right angle and in a condition unfavourable for forcible extension. In one of the cases the femur only was divided just above the joint; but in the other the tibia was cut through as well, immediately below the articulation, and the angular contraction was corrected

at the expense of the divided bones. Both patients have made a good recovery, and are walking about well with high-soled boots, which were rendered necessary because in both cases the affected limb had from long disuse been somewhat less developed than that of the opposite side.

The justification of operations like these undoubtedly depends entirely on the possibility of guaranteeing a successful termination. We believe that we are not assuming too much in saying that we have by degrees attained sufficient practice and experience in the antiseptic treatment of wounds, to be really able to promise such a result with certainty.

I had hoped to have been able to publish before now the communication which I made on the antiseptic treatment and Lister's mode of dressing, on the occasion of the third "Congress der deutschen Gesellschaft für Chirurgie;" but as this has unfortunately not been the case, I may perhaps be allowed to mention here a few facts for the purpose of showing how greatly the danger of some forms of injury which were formerly followed by a very high rate of mortality, is diminished by this procedure.

Since the introduction of the antiseptic method into my clinique, now exactly two years ago (at the end of November 1872), no single patient suffering from a compound fracture in which conservative treatment was attempted, has died. Amongst this number are included even those cases in which conservative treatment was only resorted to because the patients would not give their consent to amputation, and also those in which we at first underestimated the severity of the injury, and afterwards intermediate or secondary amputation had to be undertaken on account of hæmorrhage or gangrene. The number of compound fractures successfully treated without a single fatal result in our hospital, which is old and always overcrowded, and offers the most unhealthy hygienic conditions, amounts at present to 31. Amongst these were as many as 19 compound fractures of the leg, in several instances much comminuted and often complicated with most severe bruising and laceration of soft parts. There were also two compound comminuted fractures of the patella, both of which recovered with movable joints. No case of pyæmia has occurred for a year and a half, *i.e.*, since July 1873, although during this period alone about 60 major amputations have taken place.

Osteotomy has only been practised extensively during the last year, and whereas it used formerly to be restricted to a few isolated cases in the leg, its employment is now extended to the thigh. In the "Centralblatt für Chirurgie," No. 1, 1874, are published two cases of extreme contraction of the hip-joint, in which I removed a wedge-shaped piece of bone from the femur below the trochanter.

During the year 1874, I have performed osteotomy 13 times (the division of two bones in the same patient being counted as two operations), and of these 10 recovered without any suppuration at all,

and the others with only the most trifling possible amount. In all the local reaction was absolutely *nil*, and in no case did the slightest redness or swelling of the soft parts take place, to say nothing of any phlegmonous inflammation. All these operations were performed with a chisel; and if, as in most cases, a simple division of the bone, and not the removal of a wedge-shaped piece, was intended, the instrument employed was extremely narrow, but at the same time rather stoutly made, with a cutting edge only two or three lines broad. To prevent the chisel from becoming jammed and sticking fast in the deeper parts of the incision into the bone, I made use of instruments of varying thickness. The superficial part was divided with the stoutest, the deeper with a thinner, and the deepest with the thinnest instrument of all, so that the cleft was slightly wedge-shaped. The posterior layer of compact tissue was never completely cut through, but was broken, so that no risk might be run of injuring the soft parts behind.

It is almost superfluous to say, that the treatment of contractions of the knee by osteotomy is only indicated in those cases where a considerable angular deformity exists, which renders walking impossible, and where at the same time forcible straightening is either impracticable or inexpedient. Such cases are, however, pretty frequent, and it would require a full discussion of the pathology of ankylosis of the knee, to exhaust all the conditions which may possibly come under this category. Wide and old osseous ankyloses will sometimes render straightening impossible, in spite of the employment of the greatest force. If there be extensive cicatricial adhesion of the epiphyses to the integuments, forcible extension may be a very dangerous undertaking. At other times the patella is firmly united to the lower aspect of the articular surface of the femur, in a position of more or less flexion, and all attempts to dislodge it are unsuccessful. As it then occupies the part destined for the head of the tibia when the leg is straight, the reduction of the latter bone to its natural, or anything approaching its natural, position is impossible, and a powerful attempt at forcible straightening could only result in dislocation of the tibia backwards.

In another class of cases a dislocation, or at all events a subluxation, has already occurred. The head of the tibia is placed behind the lower end of the femur, or perhaps still occupies a position opposite part of the articular cartilage, and is fixed here by old adhesions. The bent position of the knee allows the broad upper surface of the tibia to press against the femur, and so the flexed limb is firm and can bear the weight of the body if resting on a support. But if the knee be now forcibly straightened, and the thigh and leg are brought approximately into the same straight line, the femur and tibia come to lie one behind the other, and lose their points of mutual contact and support. The leg when thus straightened is excessively weak and powerless, and patients, as a rule, complain of prolonged pain from the stretching of the soft

parts in the attempts at reduction, which pain constantly persists until the limb has returned to its old position. A recurrence of the contraction is under such circumstances very common and often altogether unavoidable.

Lastly, I will draw attention to another very interesting but hardly recognised form of alteration in the shape of the articular surfaces, which I have almost always observed in cases where contraction of the knee has commenced in early childhood, and has existed ever since. I have had several opportunities of examining this condition pathologically. If far advanced, it renders the straightening even of a partially movable joint impossible. It consists of a prolongation of the condyles of the femur, in the direction of the long axis of the bone, and it is brought about by the overgrowth of the lower part of the articular surface, because it has been released from the pressure of the head of the tibia, and from the weight of the body in walking, as a result of the permanently flexed position of the joint. A longitudinal section of the condyles of the femur assumes in consequence the shape of a long ellipse. As two of my preparations show, this elongation may reach a very extraordinary degree, and then a condition exists which is easily mistaken for a luxation of the tibia backwards, on account of the great prominence of the condyles of the femur. In such cases, however, a dislocation of this sort is by no means always present; although when it does exist it will greatly favour the development of the condition in question. I am also of opinion that where there is at first a smaller amount of flexion, it will be gradually increased by the growing projection of the condyles, while the contraction in its turn leads to further overgrowth in the femur. But if there be only a slight dislocation or none at all, the continual pressure of the head of the tibia, forced firmly as it is against the lower end of the femur by cicatricial shortening of the ligaments, and contraction of the muscles, prevents the increase of the articular end of the femur in its antero-posterior diameter, and the long egg-shaped condition of the epiphysis is considerably exaggerated by the deficiency of growth in the posterior portion, whilst the head of the tibia at the same time has its development interfered with and remains dwarfed.

The accompanying figure (not here reproduced), though rough and diagrammatic, is drawn to scale from a preparation in my possession, and will serve to illustrate this state of things, and to show that even though the joint is far from obliterated, the contraction is irreducible, because the lateral ligaments would have to be stretched to two or three times their present length, in order to allow the tibia to occupy the same position on the femur that it does when the limb is straight. When, however, the prolongation is less marked, I have seen forcible extension succeed without producing dislocation, but accompanied by distinct impaction of the projecting part.

The peculiar conditions above described were present in both the following cases treated by osteotomy.

1. Therese Tittel, a strong girl thirteen years of age, had suffered from white swelling when four years old, which, after discharging spontaneously and lasting for many years, subsided, leaving the knee flexed at a right angle. Both thigh and leg were badly developed as compared with the other side. Foreible straightening offered no prospect of a successful result; because, although a very slight movement remained in the joint, the patella was firmly aneliylosed to the external condyle in the position of extreme flexion; and, further, the lower end of the femur was prolonged in the manner that has been described. And, indeed, the prolongation was so extremely great at the inner condyle that, even if straightening had been in other respects possible, it would have caused an exaggerated *genu valgum*. All attempts at foreible extension being thus out of the question, division of the shaft of the femur with a chisel was undertaken on the 8th of August 1874, the antiseptic treatment being employed. The incision in the skin was 3 e.m. long, situated 7 c.m. above the middle of the joint on the anterior and outer aspect of the limb. Simple division of the bone was performed in the manner described. No sutures were inserted, Lister's dressing was applied, and a plaster-of-Paris splint with a window and pelvic band was placed on the extended limb. No fever followed the operation, and healing took place without the slightest local inflammation or suppuration. During the first week, the wound, which gaped slightly, was occupied by a blood clot, and then the most superficial layer of this turned a yellowish colour, and discharged traces of a serous, not purulent, orange-yellow fluid. The dressing was left on from day to day, and changed but seldom. On the 10th September, the thin superficial layer of the clot, of almost leathery consistence, separated, and underneath it healing was found to be complete. The epidermis had gradually penetrated from the cutaneous margins of the wound into the clot, separating this superficial layer like a thin sequestrum. On removing the plaster-of-Paris on the following day, the divided bone was found already consolidated. The patient was provided with a support having a sole 4 e.m. high, by help of which she soon learned to walk without a stick. The bent condition of the femur at the seat of operation is easily perceptible by the touch, but little apparent to the eye. The scar is 2.5 e.m. long, and 1.5 e.m. broad.

2. Marie Hoffman, a girl about thirteen years of age, in feeble health, had suffered from *tumor albus* of the left knee six years before, the joint remaining flexed at a right angle. A very slight amount of passive movement was possible in this case as in the last. The tibia was almost completely dislocated backwards, and at the same time there was a most unusual elongation of the condyles of the femur. The size of the limb was very considerably less than that of the right. In order to avoid excessive angular deformity, the tibia was divided below the joint, as well as the femur above it, by means of a chisel, the knee being thus rendered movable *en*

masse. This was done on the 12th of August 1874. The incisions in the soft parts were each not quite 4 e.m. long, and the bones were divided 5 e.m. above and 6 e.m. below the articular surfaces. The further treatment resembled that of the last case, and the course of events was precisely the same, inasmuch as here also there was neither fever nor suppuration. On the 14th September the organization of the lower parts of the clot was complete, and on removing the dressings, the wounds were found smoothly healed over, and the bones consolidated. The girl soon learned to walk with a support, having a sole 5 e.m. high. The deformity in this patient is much more considerable than in the other case, as the whole region of the knee projects abruptly from the level of the straightened limb. The upper scar is 3 e.m. long and 1 e.m. broad, the lower is somewhat smaller.



